in the last six years, 3166, or 6.54 per cent., were complicated with some other acute specific, which in 1094 cases was diphtheria. The great frequency of this complication was easily understood when one reflected on the favorable conditions presented by the throat, during or shortly after scarlatina, for the reception of the diphtheritic bacillus, and the fact that one attack of diphtheria, so far from conferring immunity, tended rather, by the unhealthy state of the fauces that often persisted, to render the individual more susceptible than others to infection.

VACCINE AND GLYCERIN.

THE dilution of vaccine lymph with a certain proportion of glycerin has long been practised, especially under the pressure of epidemics and panics, with a view to render a limited supply available for the vaccination of a large number of persons.

Its use in moderation was not found to impair the activity of the lymph, while it presented the advantage of preventing the drying up of the lymph during the prolonged exposure unavoidable under such circumstances, and the procedure was looked on as a harmless sort of adulteration, quite justifiable, though not to be commended in itself.

But DR. MONCKTON COPEMAN in his researches on vaccinia, having satisfied himself that the well-known cloudiness that appears in lymph stored in capillary tubes was due, not to coagulation, but to the rapid growth of extraneous aërobic organisms, originally present in the lymph, though in inappreciable numbers, and that they not only caused the progressive deterioration of the lymph by crowding out the specific microbes, but in some cases, at any rate, gave rise to the irregular, excessive, and erysipelatoid inflammations that occasionally followed on vaccination, even when no subsequent infection of the wound from without could be established, turned his attention to this property of glycerin, and with results of the highest practical value. He found that lymph was actually improved by the addition of an equal volume of a 50 per cent. solution of glycerin in sterilized water, not merely remaining perfectly clear and fluid for an indefinite time, but positively gaining in activity for six months at least.

It would appear that, though no purely artificial culture medium has as yet been discovered, there is no necessary tendency to extinction of the microbes in pure cultures in the natural serum so long as the access of air and of foreign micro-organisms is excluded, and that the glycerin, by inhibiting the growth of the latter, permits the proliferation of the proper microbe and the accumulation of their products to go on unchecked; and this is a necessary step in the direction of their isolation and culture under artificial conditions. It is true that their very existence is hypothetical, that they have hitherto eluded, and may indeed forever continue to elude our vision; but this is merely a question of magnitude.[1] If they be as much smaller than those of tubercle or of anthrax as these are than the torulæ, it is possible that no magnifying, illumination, or staining will ever suffice for their recognition; but our belief in the specific nature of pathogenic microbes, whether or not confirmed by ocular demonstration, rests rather on the constant results of inoculation experiments, without which we could not positively assert their causal connection with the several diseases, although they might be invariably present.

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[1] Since writing this I have heard that Dr. Copeman has demonstrated the presence in a number of samples of absolutely pure lymph of an extremely minute and hitherto unrecognized bacillus, which can scarce be other than the object of his search, although up to the present he has failed to cultivate it in artificial media.

If the perpetuation of the vaccine lymph in an active state out of the body of man or beast, for which the Grocers' Prize of £1000 was offered, should be achieved, one objection urged by the opponents of vaccination would be removed; but we are already greatly indebted to Dr. Copeman for showing how lymph may be preserved for months absolutely free from any deterioration or enfeeblement.

Citric Acid in the Local Treatment of Diphtheria.

Most suggestions for the local treatment of diphtheria have been consciously or unconsciously based on the now well-established fact that the throat affection, which in scarlatina is simply one local manifestation (the rash being another) of a general disease, is in diphtheria the indication of the recent invasion of that particular mucous surface by the bacilli, which do not extend beyond the immediate vicinity of the cervical glands at the farthest, though diffusing thence a poison, as Roux and Yersin have shown; or more accurately, according to Hunter, a ferment that generates the poison to which the general and nervous phenomena are due. To destroy the bacilli on their first landing, as it were, before they have had time to intrench themselves in the deeper tissues, is the aim of such treatment; and the local application of germicides, among which the strong caustics, mineral acids, perchloride of iron, etc., of the older practitioners must be included, as well as the mercury iodide and the eucalyptus oil of Illingworth and Curgenven respectively, has been productive of more or less encouraging results in lessening the subsequent general infection.

Dr. Hugo Laser, assistant in the Hygienic Institute of Königsberg, considering the difficulty of applying caustics in children, and fearing that any injury to the mucous membrane by the use of stiff brushes or otherwise might actually assist the entrance of the bacilli into the submucous tissues, proposed to try citric acid in solutions that should be astringent rather than caustic. Espine and De Marignac had shown that salicylic and citric acids and lemon juice destroyed both the false membrane and the bacilli [boric acid, alum, and potassium chlorate being quite useless], and Abadie used it in strong, almost caustic, solution every five hours at first, and every eight to twelve later on. Babès had treated cultures in various ways with a number of established or reputed germicides, of which, under all circumstances, sublimate proved the most active, potassium permanganate far better than one would have expected, and citric, lactic, and acetic acids fairly satisfactory.

Laser confined his attention to citric acid and lime juice (citric acid, ⅞ per cent.; sugar, etc., ¾ per cent., and salt, 2 per cent.), varying his experiments in every way as regards the strength of the acid, the frequency, duration, and mode of its application, and the nature of the culture medium. He next treated portions of diphtheritic membrane by dippings and washing, and last